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Abstract

Disclosed is an optical waveguide fiber preform and an optical waveguide fiber drawn therefrom, in which the density and thus the effective refractive index of the clad layer is caused to change in a pre-selected way axially along the waveguide preform and the associated waveguide fiber. The axial change in density of the clad layer is due to the fraction of the clad volume that is air or a glass of a composition different from that of the base clad glass. The axially variation in clad index changes the signal mode power distribution, thereby changing key waveguide fiber parameters such as magnitude and sign of dispersion, cut off wavelength and zero dispersion wavelength. The invention includes methods of making the structures having an axially varying clad layer. The invention relates to preforms and associated waveguide fibers which guide light due to difference in refractive index between core and clad. The invention also contemplates preforms, in which the waveguide fibers drawn therefrom, guide light due to the photonic crystal structure of all of the clad layer length or segments of the clad layer length.

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